8. The electronic device of Claim 1, further comprising four rows of leads.

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9. (Amended) The electronic device of Claim 1, wherein the bump indentations are v-shaped.

REMARKS

This application has been carefully reviewed in light of the office action mailed March 18, 2002. Claims 1-3 and 6-9 are pending in this application. Applicant respectfully requests early and favorable acceptance of this application.

REJECTIONS

Rejections under 35 U.S.C. § 103

Claims 1-3, and 6-9 are rejected under 35 U.S.C. § 103(a) as being anticipated by Huang et al in view of Mizuno. Applicants respectfully traverse the rejection.

Claim 1 as amended recites an electronic device (e.g., 800) that includes a leadframe having a die carrier (e.g., 106) and a plurality of leads (e.g., 108) having a first surface formed having bump indentations (e.g., 109) and a second surface having bump terminals (e.g., 110). A semiconductor die has a surface supported by the die carrier and formed with a plurality of conductive bumps (e.g., 802) for directly attaching to the plurality of bump indentations.

The Huang et al reference shows a thermally enhanced quad flat non lead package in figure 3 having leads 202 with surfaces 206a and 206b. Both surfaces 206a and 206b are flat and the chip 208 is wire bonded 216 to the lead 202.

The Mizuno reference shows a lead frame for face down bonding wherein one side of the lead 3 has an indentation 4 for mounting a chip 1 using bumps 2. The Mizuno reference lead 3 lower surface is flat.

The references either alone or in combination do not disclose, teach or suggest the invention. Neither reference discloses leads having bump indentations on a first surface and bump terminals on a second surface. The Huang et al. reference shows leads having no bump indentations or terminals at all, while Mizuno shows an indentation 4 on the top surface, but no bump terminal on another surface. Consequently, the reference devices do not have a low cost and reduced lead inductance of the claimed device.

Therefore, Applicants believe the rejection under 35 U.S.C. § 103 is overcome. As claims 2-3, and 6-9 depend from claim 1, they should be allowable for at least the same reasons.

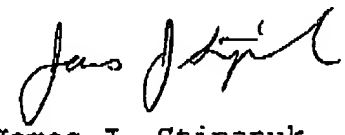
CONCLUSION

Applicant has made an earnest attempt to place this case in condition for allowance. Claims 1-3 and 6-9 are pending in the application. In light of the remarks set forth above, applicant respectfully requests reconsideration and allowance of all claims.

While no fees are believed due, the Commissioner is hereby authorized to charge any fees or credit any overpayment to Deposit Account 501086.

If there are matters that can be discussed by telephone to further the prosecution of this application, applicants invite the examiner to call the undersigned attorney at the examiner's convenience.

Respectfully submitted,
Aik Chong Tan et al.



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Date: July 8, 2002

Version with Marking to Show Changes Made

In the specification

Please replace the paragraph starting on page 4 line 25 of the application with the following.

FIGURE 4a and 4b illustrate an exemplary way to produce bump terminal 110 in a lead frame. Illustrated in FIGURE 4a is a stamping tool 402, a bump cavity block 404 with a plurality of opening 406 and a cross-section of assembly 102 of lead frame 100 with optional notches 109. The stamping tool 402 is operable to press down on leads 108 to form bump terminals 110, as seen in FIGURE 4b. While these figures illustrate the formation of bump terminals 110 on a single terminal, a stamping tool [3]4402 could be designed to stamp any number of assemblies. The shape and design of stamping tool is for exemplary purposes only. Any tool operable to mechanically form bump terminals are within the scope of the present invention.

In the claims

Please amend the claims as follows.

1. (Twice Amended) An electronic device comprising:

a leadframe having a die carrier and a plurality of leads having a first surface formed having bump indentations and a second surface formed having bump terminals; and

a semiconductor die having a surface supported by the die carrier, wherein the surface is formed with a plurality

of conductive bumps for directly attaching to the plurality of bump indentations.

9. The electronic device of Claim 1, wherein the bump indentations are [further comprising a plurality of] v-shaped[notches formed on the leads].